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(54) METHOD AND MOULD TOOLS FOR INJECTION MOULDING A PLASTICS MATERIAL PART IN A PACKAGING SHEET MATERIAL

VERFAHREN UND FORMWERKZEUGE ZUM SPRITZGIESSEN EINES TEILS AUS PLASTIKMATERIAL IN EIN VERPACKUNGSBLATTMATERIAL

PROCEDE ET OUTILS DE MOULAGE POUR MOULAGE PAR INJECTION D'UNE PARTIE CONSTITUEE D'UN MATERIAU PLASTIQUE DANS UN MATERIAU POUR FEUILLE D'EMBALLAGE

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Description

[0001] The present invention relates to a method of injection moulding a plastics material part in a hole which is disposed in a packaging sheet material, and to mould tools in an injection moulding apparatus therefore. In particular, there is disclosed a method and mould tools for injection moulding a synthetic plastics material opening device to a packaging sheet material.

[0002] Opening devices of different types provided on a packaging container formed by packaging sheet material and adapted for containing substances such as foodstuffs, and in particular for containing liquid beverages such as juices, water, milk, wine, etc. are known.

[0003] One such opening device includes a perforation on a wall part of the packaging container and a plastics material lid device attached to the wall part and covering the perforation in a closed state. The lid device includes a circumferential base attached to the wall part, for example by means of adhesives, circumferentially surrounding the perforation, and a lid element hinged to the base. Once the lid element is opened, the perforation may be engaged and forced open so that the contents inside the packaging container may be dispensed therefrom.

[0004] Another known opening device includes an opening provided on a wall part of the packaging container and a plastics material lid device similar to the one described above attached to the wall part and covering the opening in a closed state. A sealing element such as an aluminium pull tab is connected to the wall part so as to cover the opening, and once the lid element has been opened, the sealing element may be removed to expose the opening for dispensing the contents of the packaging container.

[0005] Methods for providing the above opening devices on the packaging containers may include feeding a continuous web of packaging sheet material to a first station at which the perforation or opening is provided on the web, and to a second station at which the lid element is attached to the web for covering the perforation or opening. The aluminium pull tab, if provided i.e. for covering the opening, is attached in an intermediate step. After the opening devices are provided on the web, packaging containers from the web are formed, filled with product, and sealed, such that the opening devices are arranged on the finished container packagings for easy access. One example of a machine for forming, filling, and sealing packaging containers is the TB8 filling machine manufactured by Tetra Brik Packaging Systems of Modena, Italy.

[0006] As an alternative to the above opening devices, in which an already formed plastics material lid device is applied to the packaging sheet material, U.S. Patent No. 4,725,213 (the disclosure of which is incorporated herein by reference) discloses a plastics material opening device which is injection moulded directly onto the sheet of packaging material. In particular, a pair of mould tools are moved into arrangement about a prestamped hole in the sheet, and heated thermoplastics material is injected through an injection passage defined between one of the mould tools and one surface of the sheet and extending along such surface of the sheet in order to form the opening device at the prestamped hole. The mould tools are shaped so that the formed opening device includes a pair of circumferential flange portions each of which is attached to the opposite surfaces of the sheet at the edge of the prestamped hole, thereby attaching the opening device to the sheet.

[0007] Although the method and apparatus for providing this latter type of opening device may be completely valid, there exists in the field of thermoplastics material injected opening devices the need for further improvements.

[0008] It has been found for example that there exists a problem of controlling the flow of the injected thermoplastics material into the moulding cavity formed by the moulding tools so as to provide a proper positioning of the portion of the sheet adjacent the prestamped opening with respect to the opening device. Generally the portion of the sheet of packaging material adjacent the opening has a very low stiffness and during the injection moulding process such sheet portion is subjected to thermoplastics material at elevated pressures and temperatures. As a consequence this sheet portion adjacent the opening has the undesirable tendency to bend and finally end up in random positions in its connection to the injected opening device. What is needed is a method for injection moulding a thermoplastics material opening device onto a packaging material sheet which allows to achieve uniformity and assuredness with regard to the correct positioning of the sheet with respect to the opening device.

[0009] The above described bending tendency of an uncontrolled sheet portion adjacent the opening may lead to a situation in which during the thermoplastics injection step, the edge at the opening of the sheet portion may be in substantial contact with one of the mould tools and consequently plastics material will not flow between such mould tool and the surface of the sheet portion in contact therewith. As a result, the edge of the opening will be sealed in a poorer manner than would be an opening edge in which the plastics material of the opening device extends at least for a certain portion along the surface of the portion of the sheet adjacent the opening. Generally, the packaging sheet material is formed of several layers including an inner paper layer and two outer synthetic plastics material coating layers, one of which is destined to form a product contact surface. Other possible layers such as printing ink layers, laminating layers and aluminium foil layers may be interposed between the paper layer and the outer coating layers. When the opening in the packaging sheet material is stamped, the internal layers of the packaging sheet are exposed at the edge of the opening, and unless such

edge is adequately sealed by the injected thermoplastics material opening device, the packaged product may come into contact with the internal layers of the packaging sheet material possibly causing damage thereto. What is needed is a method for injection moulding a thermoplastics material opening device onto a packaging material sheet which allows to assure that an adequate seal is obtained by the injected opening device at the edge of the opening formed in the packaging material sheet.

[0010] Known from US-A-4 076 790 is a method as defined in the preamble of claim 1. Also known from US-A-4 076 790 is an apparatus as defined in the preamble of claim 3.

[0011] In accordance with one aspect of the invention, there is provided a method of injection moulding a plastics material part in a hole of a packaging sheet material which includes arranging a first mould tool and a second mould tool in contact with opposite sides of the packaging sheet material so as to form a mould cavity such that the edge of the hole of the sheet is arranged in the mould cavity and such that the packaging sheet material arranged adjacent the hole edge is biased away from the second mould tool, and injecting plastics material into the mould cavity so as to form the plastics material part. The biasing of the packaging material away from the second mould tool aids in the positive formation of plastics material on a portion of the second side of the packaging sheet material arranged adjacent the portion of the hole edge, and consequently a uniformity and assuredness with regard to the correct positioning of the sheet with respect to the opening device is obtained. Moreover, the formation of plastics material on a portion of the second side near the hole edge efficiently creates an excellent seal at the hole edge and at the second side, which aids in assuring that products will not come into contact with the inner layers of the material sheet if and when the second side of the packaging sheet material is destined to be a food contact surface in the final packaging container.

[0012] According to another aspect of the invention, there is provided a first mould tool and a second mould tool which are mutually arrangeable with respect to the packaging sheet material in a moulding position such that the packaging sheet material is sealingly disposed between the first and second mould tools and such that a mould cavity is formed by the first and second mould tools in which at least a portion of the hole edge of the packaging sheet material is arranged. The first and second mould tools have a moulding configuration in the moulding position such that the packaging sheet material arranged adjacent the portion of the hole edge is biased away from the second mould tool, thereby to aid in the formation of plastics material on a portion of the second side of the packaging sheet material arranged adjacent the portion of the hole edge.

[0013] The moulding configuration further includes a gap formed between the first and second mould tools for sealingly accommodating the packaging sheet material, in which the gap has a width dimension which is smaller than an average thickness of the packaging sheet material, thereby to compress the packaging sheet material in the gap in the moulding position. This particular configuration is such that the packaging sheet material arranged adjacent the hole edge is bent at an angle with respect to the plane of extension of the packaging sheet material arranged substantially outside of the mould cavity, thereby to achieve the advantageous biasing action on the sheet.

[0014] In one preferred embodiment, the moulding configuration of the first and second mould tools in the moulding position includes an edge of the first mould tool which makes contact with the first side of the packaging sheet material at a first contact line, and an edge of the second mould tool which makes contact with the second side of the packaging sheet material at a second contact line, such that the first contact line is arranged farther from the hole edge than the second contact line.

[0015] According to another preferred embodiment of the invention, the moulding configuration of the first and second mould tools includes a gap formed between the first and second mould tools for accommodating the packaging sheet material, in which the gap has an extension which lies in a plane extending angularly into the mould cavity in a direction extending away from the second mould tool, thereby to achieve the advantageous biasing action of the sheet.

[0016] The technical characteristics and advantages of the present invention will become apparent to those skilled in the art from the following detailed description of some preferred embodiments thereof, described and illustrated in the accompanying drawings only by way of non-limitative example, wherein like reference numerals indicate like parts.

Fig. 1 is a sectional side elevation view of a configuration of mould tools for injecting a thermoplastics material opening device on a packaging material sheet in accordance with one preferred aspect of the invention;

Fig. 2 is an enlarged sectional side elevation view of the detail "A" of Fig. 1, showing a portion of the sheet adjacent a hole in the sheet disposed inside a mould cavity formed by the mould tools before injection of thermoplastics material;

Fig 3. is an enlarged detail view similar to the detail of Fig. 2, showing the sheet arranged in the mould cavity after the injection of the thermoplastics material opening device;

Fig. 4 is an enlarged detail view similar to the detail of Fig. 2, showing mould tools according to another preferred aspect of the invention forming a mould cavity inside which the sheet is disposed before injection of thermoplastics material;

Fig. 5 is an enlarged detail view similar to the detail of Fig. 4, showing the sheet arranged in the mould

cavity after the injection of the thermoplastics material opening device; and

Fig. 6 is an enlarged detail view similar to the detail of Fig. 5, showing mould tools according to another preferred aspect of the invention forming a mould cavity relative to the sheet which allows to inject thermoplastics material on both sides of the sheet.

[0017] With reference to Fig. 1, an inner mould tool 2 and a pair of outer mould tools 4 and 6 are mutually arranged with respect to a packaging sheet material 8 in a moulding position such that the packaging sheet material is disposed between the inner mould tool 2 and the outer mould tools 4 and 6, and such that a mould cavity 10 is formed by the mould tools in which the edge 12 of a hole provided in the sheet 8 is arranged. The mould tools are also arranged with respect to a thermoplastics injection head 14 so that heated thermoplastics material may be fed through a channel 16 of the head 14 into the mould cavity 10 in order to form, upon cooling of the heated thermoplastics material, an opening device connected to the sheet 8 at the hole edge 12.

[0018] The packaging sheet material 8 may be of any type and shape. For example, sheet 8 may be a continuous web of packaging material, or a blank of packaging material, or a protruding flap of packaging material. In one preferred embodiment, sheet 8 is a synthetic plastics coated paper carrier material.

[0019] The mould cavity 10 includes in the embodiment shown a portion 10a for forming a lid portion of the opening device, a portion 10b for forming a base portion of the opening device for connection to the sheet 8, and a portion 10c for forming a reduced thickness tearing edge of the opening device for aiding in releasing the lid portion from the base portion. The present disclosure relates more in particular to the manner in which the opening device is attached to the sheet 8 at the hole edge 12 thereof, while the opening device may assume any number of different overall shapes,

[0020] In the embodiment shown, the hole edge 12 is circumferential to completely enclose the hole in the sheet 8, and preferably the entire hole edge 12 is arranged inside the base portion 10b of the mould cavity 10 prior to injection, the base portion 10b also being circumferential and having a dimension sufficient to completely enclose hole edge 12. Preferably, the hole edge 12, the base portion 10b, and the connecting portion 10c are ovular ringshaped in a longitudinal cross section extending substantially parallel to the extension of the sheet, and the lid portion 10a is ovular disc-shaped in a longitudinal cross section extending substantially parallel to the extension of the sheet. Moreover, in the moulding position a gap 18 is formed between the mould tools which preferably has a width dimension smaller than the thickness of the packaging sheet material 8 thereby to compress the sheet 8 inside the gap and form a seal sufficient to prevent any significant leakage of the heated thermoplastics material outside of the mould cavity 10.

[0021] The moulding position of Fig 1 may be obtained in any number of ways as will be apparent to those skilled in the art. For example the inner mould 2 may be moved up and down vertically in the direction of arrow B, and the outer moulds 4 and 6 may be moved up and down vertically, and inwardly and outwardly horizontally, according to the directions C and D respectively, while the injection head 14 may remain in essentially a fixed position. When the mould tools are arranged in a fully open position, the packaging sheet material may be intermittently fed in direction E into a correct position with the hole edge 12 properly aligned, whereupon the mould tools may be moved into their fully closed position corresponding to the moulding position of Fig. 1, and heated thermoplastics material may be fed through the channel 16 of the injection head 14 for filling the mould cavity 10 and forming the opening device on the sheet. Release of the mould tools will permit the sheet 8 to again be fed in the direction E, so as to arrange another hole edge 12 in proper position for receiving an opening device. Downstream after the opening devices are provided on the sheet, packaging containers from the sheet may be formed, filled with product, and sealed. Methods and apparatus sufficient for feeding the sheet 8, for stamping the holes in the sheet 12, for moving the mould tools, for injecting the heated thermoplastics materials, and for forming, filling and sealing the packaging containers are within the realm of those skilled in the art.

[0022] Fig. 2 shows a moulding configuration 20 of the inner and outer mould tools corresponding to the moulding position of Fig. 1. The inner mould tool 2 is arranged in contact with an inner side 22 of sheet 8 while the outer mould tool 4 is arranged in contact with an outer side 24 of the sheet 8. The moulding configuration 20 of the outer and inner mould tools biases the portion of the packaging sheet material 8 arranged adjacent the hole edge 12 away from the inner mould tool 2. Once the biasing of the sheet 8 has been achieved, heated thermoplastics material may be injected into the mould cavity 10 to form an opening device 26 attached to the hole edge 12 of the sheet 8 (Fig. 3). The biasing of the sheet 8 away from the inner mould tool assures that a plastics material portion 28 is formed on a portion 30 of the inner side 22 of the sheet 8 arranged adjacent the hole edge 12.

[0023] The biasing of the sheet 8 in the mould cavity 10 and the positive formation of the plastics material portion 28 provides a uniformity and assuredness with regard to the correct positioning of the sheet 8 with respect to the opening device 26, since the sheet is held in a correct and biased position during the step of injection. Moreover, the formation of the plastics material portion 28 at the portion 30 of the inner sheet side near the hole edge 12 efficiently creates an excellent seal at the hole edge and at the inner sheet side, which advantageously aids in assuring that products will not come into contact with the inner layers of the material sheet when the inner side of the packaging sheet material is destined to be a

food contact surface in the final packaging container.

[0024] The moulding configuration 20 of the inner mould tool 2 and outer mould tool 4 includes an edge of the outer mould tool 4 which makes contact with the outer side 24 of the packaging sheet material 8 at a first contact line 32, and an edge of the inner mould tool 2 which makes contact with the inner side 22 of the packaging sheet material 8 at a second contact line 34, such that the first contact line 32 is arranged farther from the hole edge 12 than the second contact line 34. The compression of the sheet 8 inside the thinner gap 18 formed between the outer and inner mould tools and the spatial arrangement of the first and second contact lines 32 and 34 causes a portion 8a of the sheet 8 arranged adjacent the hole edge 12 to be bent at an angle with respect to the plane of extension of the sheet arranged substantially just outside of the mould cavity 10, thereby to bias such sheet portion 8a away from the inner mould tool 2.

[0025] Fig. 2 shows that in the moulding position, the moulding configuration 20 of the inner and outer mould tools is such that the hole edge 12 of the sheet 8 essentially makes contact with the outer mould tool 4. In this manner, during the thermoplastics material injection step, plastics material is not formed on the outer side 24 of the sheet 8, as seen in Fig. 3. It is however possible to shape the outer mould tool 4 so that the hole edge 12 does not make contact with the outer mould tool 4 even after the sheet portion 8a has been biased away from the lower mould tool 2. In this manner the opening device formed by the thermoplastics injection step will include plastics material portions covering both the inner and outer surfaces of the sheet adjacent the hole edge. Fig. 3 also shows a small plastics material portion of the opening device 26 arranged in the gap 18 between the inner mould tool 2 and the inner side 22 of the sheet 8 and formed during the generally high pressure injection step. The compression of the sheet 8 in the gap 18 is however sufficient to form a seal sufficient to prevent any significant leakage of the heated thermoplastics material outside of the mould cavity 10 through the gap 18.

[0026] While the described embodiment of Figs. 1-3 shows the sheet portion 8a being biased away from the inner mould tool 2, it has also been envisaged that by changing the relative positions of the contact lines 32 and 34 such that the first contact line 32 is arranged nearer to the hole edge 12 than is the second contact line 34, it is possible to bias the sheet portion 8a away form the outer mould tool 4, if so desired. Accordingly, the particular mutual relative spacing of the contact lines for determining the extent and direction of bending of the sheet portion 8a, and the particular configuration of the mould cavity formed by the mould tools with respect to the hole edge of the sheet for determining where plastics material portions will be formed, will dictate the particular position of the sheet portion 8a in the cavity in the moulding position, so as to assure that the desired final connection and positioning of the opening device to the sheet will be effectively and efficiently obtained.

[0027] Fig. 4 illustrates a further embodiment of the invention including a moulding configuration 120 of inner and outer mould tools 102 and 104 mutually arranged in the moulding position such that the inner mould tool 102 is arranged in contact with the inner side 22 of sheet 8 while the outer mould tool 104 is arranged in contact with an outer side 24 of the sheet 8 for compressing the sheet 8 in a thinner gap 118 formed between the moulds, and such that the hole edge 12 is arranged in the mould cavity 110 formed by the inner and outer moulds. The moulding configuration 120 of the outer and inner mould tools 102 and 104 also biases the portion 8a of the packaging sheet material 8 arranged adjacent the hole edge 12 away from the inner mould tool 102. Once the biasing of the sheet 8 has been achieved, heated thermoplastics material may be injected into the mould cavity 110 to form an opening device 126 attached to the hole edge 12 of the sheet 8 (Fig. 5). The biasing of the sheet portion 8a away from the inner mould tool assures that a plastics material portion 128 is formed on a portion 30 of the inner side 22 of the sheet portion 8a arranged adjacent the hole edge 12. The biasing of the sheet portion 8a in the mould cavity 110 and the positive formation of the plastics material portion 128 provides a uniformity and assuredness with regard to the correct positioning of the sheet 8 with respect to the opening device 126, since the sheet is held in a correct and biased position during the step of injection, and the formation of the plastics material portion 128 at the portion 30 of the inner sheet side near the hole edge 12 efficiently creates an excellent seal at the hole edge and at the inner sheet side for aiding assuring that products will not come into contact with the inner layers of the material sheet when the inner side of the packaging sheet material is destined to be a food contact surface in the final packaging container.

[0028] The gap 118 of moulding configuration 120 formed between the inner and outer mould tools 102 and 104 has an extension which lies in a plane extending angularly into the mould cavity in a direction extending away from the inner mould tool 102, so as to bias the sheet portion 8a away from the inner mould tool 102 sufficiently so that the plastics material portion is positively formed at the sheet inner side portion 30. In the embodiment of Figs. 4 and 5 the contact lines at which the edges of the inner and outer mould tools make contact with the inner and outer surfaces of the sheet 8 are arranged substantially mutually opposite and therefore a bending of the sheet portion 8a with respect to the extension of the gap 118 does not occur. Rather it is the extension of the gap 118 itself which sufficiently biases the portion 8a away from the inner mould tool 102 for assuring that the desired connection and placement of the opening device 126 to the sheet 8 is effectively obtained. It has further been envisaged that a combination of the bending effect of the sheet portion 8a, as obtained in the manner described with reference to the embodiment of Figs.

1-3 by mutually spacing apart the contact lines between the edges of the inner and outer mould tools and the inner and outer sufaces of the sheet, with the angular extension arrangement of the portion 8a into the mould cavity 110 provided by the extension of the gap 118, may provide a biasing action of the portion 8a in the mould cavity suitable to obtain the desired positioning of the opening device on the sheet.

[0029] Fig. 4 shows that the hole edge 12 of the sheet 8 is slightly spaced with respect to the upper mould tool 104 in the moulding position. This slight spacing however still provides that heated thermoplastics material entering into the mould cavity 110 during the injection phase will push the sheet portion 8a into contact with the outer mould tool so that plastics material is not formed at the upper side of the sheet 8, if so desired.

[0030] Fig. 6 shows a variation of the embodiment of Figs. 4-5 in which a moulding configuration 220 formed by an inner mould tool 202 and an outer mould tool 204 includes an angularly extending gap 218 for biasing the sheet portion 8a in a mould cavity 210 away from the inner mould tool 202, and a spacing between the sheet portion 8a and the outer mould tool 204 which is sufficiently large such that after the thermoplastics injection phase an opening device 226 is formed which includes both a plastics material portion 236 arranged at the outer side 238 of the sheet portion 8a and a plastics material portion 228 arranged at the inner side 230 of the sheet portion 8a.

[0031] While the described embodiments of Figs. 4-6 shows the sheet portion 8a being biased away from the inner mould tool, it has also been envisaged that by changing the direction of extension of the moulding configuration gap, it is possible to bias the sheet portion 8a away form the outer mould tool, if so desired. Accordingly, the particular extension of the moulding configuration gap for determining the direction of extension of the sheet portion, and the particular configuration of the mould cavity formed by the mould tools with respect to the hole edge of the sheet for determining where plastics material portions will be formed, will dictate the particular position of the sheet portion in the cavity in the moulding position, so as to assure that the desired final connection and positioning of the opening device to the sheet will be effectively and efficiently obtained.

Claims

1. A method of injection moulding a plastics material part in a hole which is disposed in a packaging sheet material (8) and which defines a hole edge (12) of the packaging sheet material (8), comprising the steps of:

   arranging at least one first mould tool (4,6,104,202) in contact with a first side (24) of the packaging sheet material (8) and arranging at least one second mould tool (2, 102,204) in contact with a second side (22) of the packaging sheet material (8) and thereby forming a mould cavity (10,110,210) defined between said first and second mould tools (2,4,6,102,104,202,204) in a manner such that at least a portion of said hole edge (12) is arranged inside said mould cavity (10,110,210) and such that a sheet portion (8a) of the packaging sheet material (8) arranged adjacent said portion of said hole edge (12) is biased away from said second mould tool (2,102,204); and injecting plastics material into said mould cavity (10,110,210) so as to form said plastics material part (26) whereby the biasing of said sheet portion (8a) away from said second mould tool (2,202,204) aids in the formation of plastics material (26) on a portion of said second side (22) of the sheet portion (8a);

   characterized in that it comprises the step of arranging the first and second mould tools (2,4,6,102,104,202,204) such that the portion of the packaging sheet material (8) in contact with both the first and second mould tools (2,4,6, 102,104,202,204) is in a compressed state with respect to the portion of the packing sheet material (8) arranged inside the mould cavity (10, 110,210).

2. The method of claim 1, wherein the forming of said mould cavity (10,110,210) comprises the steps of;

   moving said first mould tool (4,6,104,202) such that an edge of said first mould tool makes contact with said first side (24), of the packaging sheet material at a first contact line (32);
   moving said second mould tool (2) such that an edge of said second mould tool makes contact with said second side (22) of the packaging sheet material (8) at a second contact line (34);

   characterized in that it comprises the step of arranging said first contact line (32) farther from said portion of said hole edge (12) than said second contact line (34) so as to bias the sheet portion away from said second mould tool (2,102,204).

3. An injection moulding apparatus for injection moulding a plastics material part in a hole, disposed in a packaging sheet material (8) having a first side (22) and a second side (24), and which defines a hole edge (12) of the packaging sheet material (8), said apparatus comprising a first mould tool (4,6,104,202) and a second (102,202,204) mould tool which are mutually arrangeable with respect to the packaging sheet material (8) in a moulding position such that the packaging sheet material (8) is sealingly disposed between the first and second

mould tools (2,4,6,102,104,202,204) and such that a mould cavity (10,110,210) is formed by the first and second mould tools (2,4,6,102,104,202,204) in which at least a portion of the hole edge (12) of the packaging sheet material (8) is arranged, wherein the first and second mould tools (2,4,6,102,104,202,204) have a moulding configuration in the moulding position such that a sheet portion (8a) of the packaging sheet material (8) arranged adjacent said portion of said hole edge (12) is biased away from said second mould tool (102,202,204), whereby to aid in the formation of plastics material on a portion of a second side (24) of the sheet portion (8a), and wherein a gap (18,118,218) is formed between the first and second mould tools (2,4,6,102,104,202,204) in said moulding position, for sealingly accommodating the packaging sheet material (8), **characterized in that** said gap (18,118,218) has a width dimension which is smaller than a thickness of the packaging sheet material (8), whereby to compress the packaging sheet material (8) in said gap (18,118,218) in the moulding position.

4. The injection moulding apparatus according to claim 3, wherein an edge of said first mould tool (4,6,104,202) makes contact with said first side (22) of the packaging sheet material (8) at a first contact line (32), and an edge of the second mould tool (102,202,204) makes contact with said second side (24) of the packaging sheet material (8) at a second contact line (34), **characterized in that** said first contact line (32) is arranged farther from said portion of said hole edge (12) than said second contact line (34), for biasing the sheet portion (8a) away from said second mould tool (102,202,204).

5. The injection moulding apparatus according to claim 3, **characterized in that** said gap (18,118,218) has an extension which lies in a plane extending angularly into the mould cavity (10,110,210) in a direction extending away from the second mould tool (102,202,204).

Patentansprüche

1. Verfahren zum Spritzgießen bzw. Injection Moulding eines Materialteils aus Kunststoff in einem Hohlraum bzw. einem Loch, der/das in einem Verpackungsschichtmaterial angeordnet ist und durch einen Hohlraum- bzw. Lochrand (12) des Verpakkungsschichtmaterials (8) definiert wird, mit den Verfahrensschritten von:

   Anordnen mindestens eines ersten Formwerkzeugs (4, 6, 104, 202) in Kontakt mit einer ersten Seite (24) der Verpackungsmaterialschicht (8) und Anordnen mindestens eines zweiten Formwerkzeugs (2, 102, 204) in Kontakt mit einer zweiten Seite (22) des Verpakkungsschichtmaterials (8) zum Bilden eines Formhohlraums (10, 110, 210) zwischen den ersten und zweiten Formwerkzeugen (2, 4, 6, 102, 104, 202, 204) in einer solchen Weise, daß sich mindestens ein Teil des Hohlraum- bzw. Lochrands (12) innerhalb des Formhohlraums (10, 110, 210) befindet und ein Schichtenteil (8a) des Verpackungsschichtmaterials (8), der neben dem Teil des Lochrands (12) angeordnet ist, von dem zweiten Formwerkzeug (2, 102, 204) hinweggezwängt wird, und
   Einspritzen bzw. Injizieren von Kunststoffmaterial in den Formhohlraum (10, 110, 210) zum Formgeben des Materialteils (26) aus Kunststoff, wodurch das Hinwegzwängen des Schichtenteils (8a) von dem zweiten Formwerkzeug (2, 2, 2, 2, 4) hinweg die Bildung von Kunststoffmaterial (26) an einem Teil der zweiten Seite (22) des Schichtenteils (8a) ermöglicht,

   dadurch gekennzeichnet,
   daß die Verfahrensstufen des Anordnens des ersten und zweiten Formwerkzeugs (2, 4, 6, 102, 104, 202, 204) derart ausgeführt werden, daß derjenige Teil des Verpackungsschichtmaterials (8), der in Kontakt sowohl mit dem ersten als auch mit dem zweiten Formwerkzeug (2, 4, 6, 102, 104, 202, 204) angeordnet wird, sich in Bezug zu demjenigen Teil des Verpackungsschichtenmaterials (8), das sich innerhalb des Formhohlraums (10, 110, 210) befindet, im komprimierten bzw. zusammengepreßten. Zustand befindet.

2. Verfahren nach Anspruch 1, bei dem das Bilden des Formhohlraums (10, 110, 210) folgende Verfahrensschritte aufweist:

   Bewegen des ersten Formwerkzeugs (4, 6, 104, 202) derart, daß ein Rand des ersten Formwerkzeugs in Kontakt mit der ersten Seite (24) des Verpackungsschichtenmaterials an einer ersten Kontaktlinie (32) gelangt;
   Bewegen des zweiten Formwerkzeugs (2) derart, daß ein Rand des zweiten Formwerkzeugs in Kontakt mit der zweiten Seite (22) des Verpackungsschichtenmaterials (8) an einer zweiten Kontaktlinie (34) gelangt,

   dadurch gekennzeichnet,
   daß die erste Kontaktlinie (32) weiter von dem Teil des Hohlraum- bzw. Lochrandes (12) als die zweite Kontaktlinie (34) angeordnet wird, so daß der Schichtenteil von dem zweiten Formwerkzeug (2, 102, 204) hinweggezwängt bzw. hinweggedrückt

wird.

3. Vorrichtung zum Spritzgießen bzw. Injection Moulding eines Materialteils aus Kunststoff in einer Ausnchmung bzw. einem Loch, die das in einem Verpackungsschichtenmaterial (8) angeordnet ist, welches eine erste Seite (22) und eine zweite Seite (24) aufweist und einen Lochrand (12) des Verpakkungsschichtenmaterials (8) bildet, bei der die Vorrichtung ein erstes Formwerkzeug (4, 6, 104, 202) und ein zweites Formwerkzeug (102, 202, 204) aufweist, die in Bezug zum Verpackungsschichtenmaterial (8) in einer Formgebungsstellung derart gegenseitig in Stellung bringbar sind, daß das Verpakkungsschichtenmaterial (8) dicht zwischen den ersten und zweiten Formwerkzeugen (2, 4, 6, 102, 104, 202, 204) einbringbar und ein Formhohlraum (10, 110, 210) durch die ersten und zweiten Formwerkzeuge (2, 4, 6, 102, 104, 202, 204) bildbar ist, bei dem mindestens ein Teil des Lochrands (12) des Verpackungsschichtenmaterials (8) so angeordnet werden kann, daß die ersten und zweiten Formwerkzeuge (2, 4, 6, 102, 104, 202, 204) eine derartige Formkonfiguration in der Formstellung einnehmen, daß ein Schichtenteil (8a) des Verpackungsschichtenmaterials (8), das sich neben dem Teil des Lochrands (12) befindet, von dem zweiten Formwerkzeug (102, 202, 204) hinwegzwängbar bzw. -drückbar ist, um die Bildung von Kunststoffmaterial an einem Teil einer zweiten Seite (24) des Schichtenteils (8a) zu ermöglichen, und bei der ein Spalt (18, 118, 218) zwischen den ersten und zweiten Formwerkzeugen (2, 4, 6, 102, 104, 202, 204) zur abdichtenden bzw. versiegelbaren Aufnahme des Verpackungsschichtenmaterials (8) in der Formungsstellung gebildet wird,
dadurch gekennzeichnet,
daß der Spalt (18, 118, 218) eine Breite bzw. Weitendimension aufweist, die geringer ist als die Dicke des Verpackungsschichtenmaterials (8), wodurch das Verpackungsschichtenmaterial (8) im Spalt (18, 118, 218) in der Formgebungsstellung zusammengepreßt wird.

4. Vorrichtung nach Anspruch 3, bei der ein Rand des ersten Formwerkzeugs (4, 6, 104, 202) in Kontakt mit der ersten Seite (22) des Verpackungsschichtenmaterials (8) an einer ersten Kontaktlinie (32) gelangt und ein Rand des zweiten Formungswerkzeugs (102, 202, 204) in Kontakt mit der zweiten Seite (24) des Verpackungsschichtenmaterials (8) an eine zweiten Kontaktlinie (34) gelangt,
dadurch gekennzeichnet,
daß die erste Kontaktlinie (32) weiter vom Teil des Lochrands (12) als die zweite Kontaktlinie (34) entfernt angeordnet ist, um das Schichteil (8a) vom zweiten Formwerkzeug (102, 202, 204) hinwegzudrücken bzw. wegzuzwängen.

5. Vorrichtung nach Anspruch 3,
dadurch gekennzeichnet,
daß der Spalt (18, 118, 218) eine Ausdehnung hat, die sich in einer Ebene befindet, welche sich winklig in den Formhohlraum (10, 110, 210) in einer vom zweiten Formwerkzeug (102, 202, 204) wegweisenden Richtung erstreckt.

Revendications

1. Procédé de moulage par injection d'une pièce en matière plastique dans un trou ménagé dans un matériau d'emballage en feuille (8) et qui définit un bord de trou (12) du matériau d'emballage en feuille (8), comprenant les étapes consistant à :

   mettre au moins un premier moule (4, 6, 104, 202) en contact avec un premier côté (24) du matériau d'emballage en feuille (8) et mettre au moins un deuxième moule (2, 102, 204) en contact avec un deuxième côté (22) du matériau d'emballage en feuille (8) et par ce moyen former une cavité de moule (10, 110, 210) définie entre le premier et deuxième moules (2, 4, 6, 102, 104, 202, 204) de manière à ce qu'au moins une partie dudit bord de trou (12) s'étende à l'intérieur de ladite cavité de moule (10, 110, 210) ec à ce qu'un élément en feuille (8a) du matériau en feuille (8) adjacent à ladite partie dudit bord de trou (12) soit incliné loin du deuxième moule (2, 102, 204) ; et
   injecter de la matière plastique dans ladite cavité de moule (10, 110, 210) de manière à former ladite pièce en matière plastique (26), l'inclinaison dudit élément en feuille (8a) loin dudit deuxième moule (2, 202, 204) contribuant à la formation de la matière plastique (26) sur une partie dudit deuxième côté (22) de l'élément en feuille (8a) ;

   caractérisée en ce qu'elle comprend l'étape consistant à disposer le premier et le deuxième moules (2, 4, 6, 102, 104, 202, 204) de manière à ce que la partie du matériau d'emballage en feuille (8) en contact avec le premier et le deuxième moules (2, 4, 6, 102, 104, 202, 204) soit dans un état comprimé par rapport à la partie du matériau d'emballage en feuille (8) s'étendant à l'intérieur de la cavité de moule (10, 110, 210).

2. Procédé selon la revendication 1, où la formation de ladite cavité de moule (10, 110, 210) comprend les étapes consistant à :

   déplacer ledit premier moule (4, 6, 104, 202) de manière à ce qu'un bord dudit premier moule vienne en contact avec ledit premier côté (24)

du matériau d'emballage en feuille au niveau d'une première ligne de contact (32) ;
déplacer ledit deuxième moule (2) de manière à ce qu'un bord dudit deuxième moule vienne en contact avec ledit deuxième côté (22) du matériau d'emballage en feuille (8) au niveau d'une deuxième ligne de contact (34) ;

caractérisée en ce qu'elle comprend l'étape consistant à disposer ladite première ligne de contact (32) dans une position plus éloignée par rapport audit bord de trou (12) que ladite deuxième ligne de contact (34) de manière à incliner l'élément de feuille loin dudit deuxième moule (2, 102, 204).

3. Appareil de moulage par injection pour le moulage par injection d'une pièce en matière plastique dans un trou disposé dans un matériau d'emballage en feuille (8) ayant un premier côté (22) et un deuxième côté (24), et qui définit un bord de trou (12) du matériau d'emballage en feuille (8), ledit appareil comprenant un premier moule (4, 6, 104, 202) et un deuxième moule (102, 202, 204) susceptibles d'être arrangés mutuellement par rapport au matériau d'emballage en feuille (8) dans une position de montage telle que le matériau d'emballage en feuille (8) soit disposé en relation d'étanchéité par insertion entre le premier et le deuxième moules (2, 4, 6, 102, 104, 202, 204) et de manière à ce qu'une cavité de moule (10, 110, 210) soit formée par les premier et deuxième moules (2, 4, 6, 102, 104, 202, 204) dans laquelle au moins une partie du bord de trou (12) du matériau d'emballage en feuille (8) est disposée, où le premier et deuxième moules (2, 4, 6, 102, 104, 202, 204) ont une configuration de moulage, en position de moulage, telle qu'un élément de feuille (8a) du matériau d'emballage en feuille (8) disposé de manière adjacente à ladite partie dudit bord de trou (12) soit incliné loin dudit deuxième moule (102, 202, 204) afin de contribuer à la formation de matière plastique sur une partie d'un deuxième côté (24) de l'élément de feuille (8a), et où un espace (18, 118, 218) est formé entre le premier et le deuxième moules (2, 4, 6, 102, 104, 202, 204) dans ladite position de moulage afin de recevoir le matériau d'emballage en feuille (8) selon une relation d'étanchéité, **caractérisé en ce que** ledit espace (18, 118, 218) a une dimension en largeur qui est inférieure à une épaisseur du matériau d'emballage en feuille (8), moyennant quoi le matériau d'emballage en feuille (8) est comprimé dans ledit espace (18, 118, 218) en position de moulage.

4. Appareil de moulage par injection selon la revendication 3, où un bord dudit premier moule (4, 6, 104, 202) vient en contact avec ledit premier côté (22) du matériau d'emballage en feuille (8) au niveau d'une première ligne de contact (32), et un bord du deuxième moule (102, 202, 204) vient en contact avec ledit deuxième côté (24) du matériau d'emballage en feuille (8) au niveau d'une deuxième ligne de contact (34), **caractérisé en ce que** ladite première ligne de contact (32) est disposée dans une position plus éloignée par rapport à ladite partie dudit bord de trou (12) que ladite deuxième ligne de contact (34) afin d'incliner l'élément de feuille (8a) loin dudit deuxième moule (102, 202, 204).

5. Appareil de moulage par injection selon la revendication 3, **caractérisé en ce que** ledit espace (18, 118, 218) comporte une extension disposée dans un plan s'étendant obliquement dans la cavité de moule (10, 110, 210) selon une orientation l'éloignant du deuxième moule (102, 202, 204).

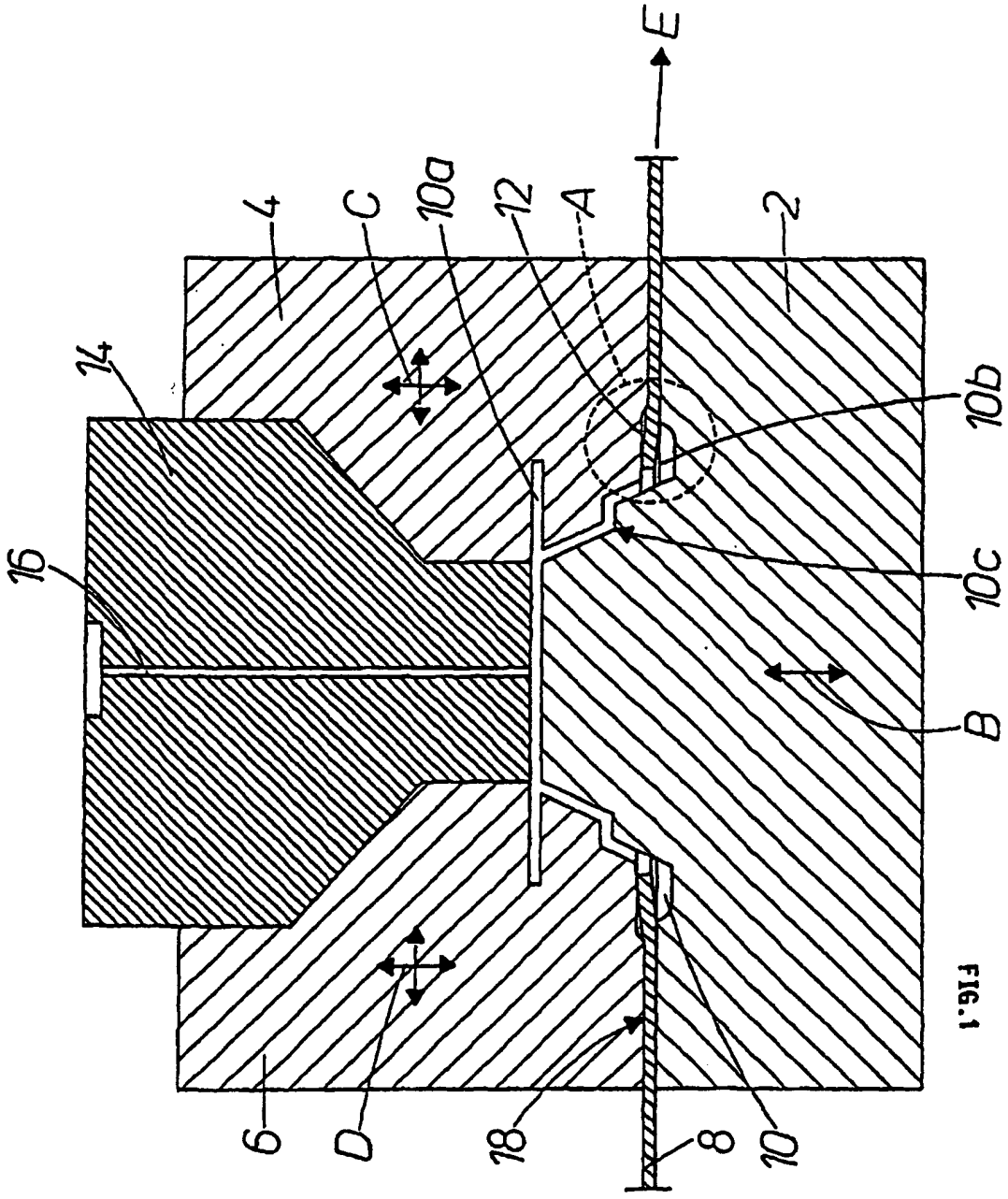

FIG. 1

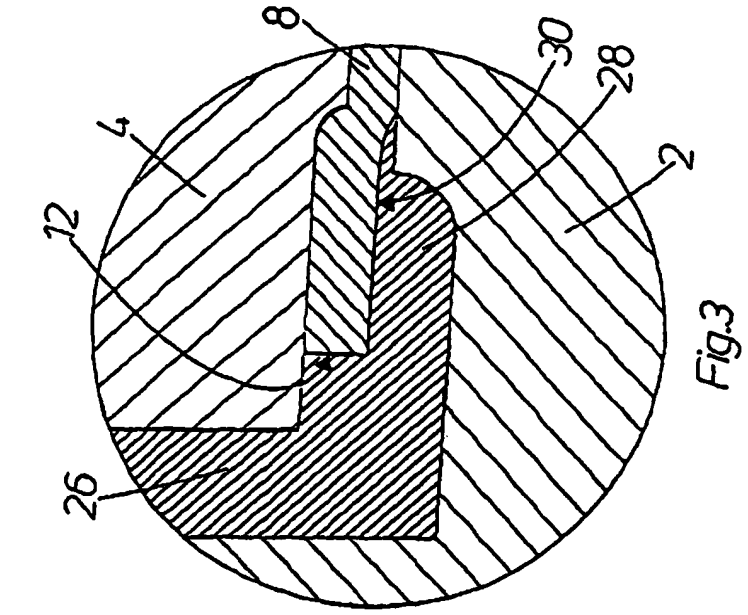

Fig.3

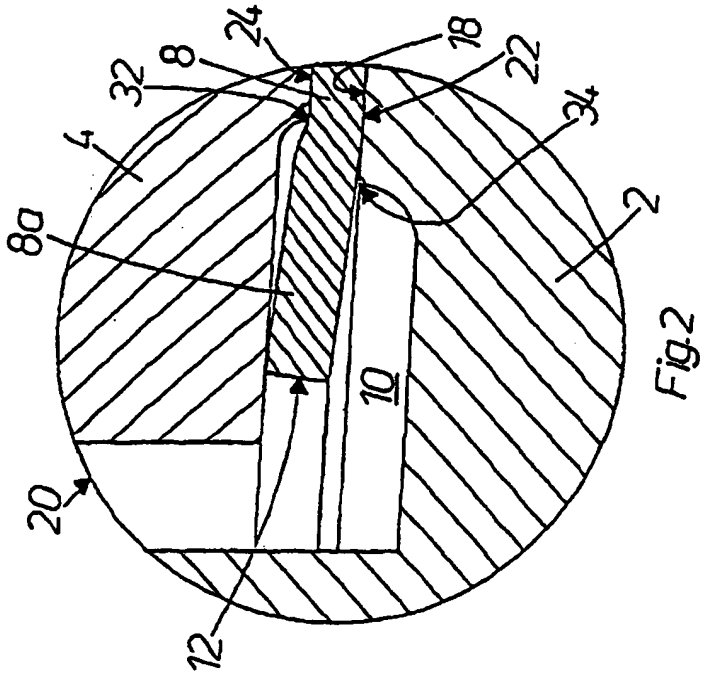

Fig.2

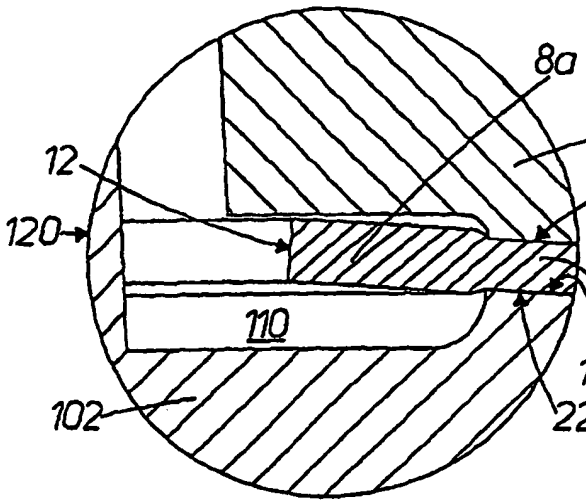

Fig.4

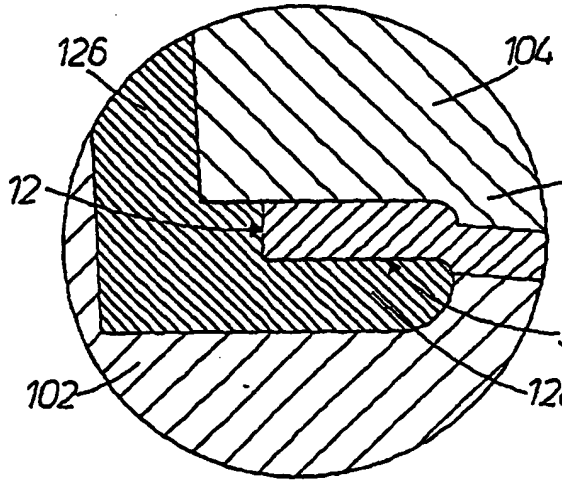

Fig.5

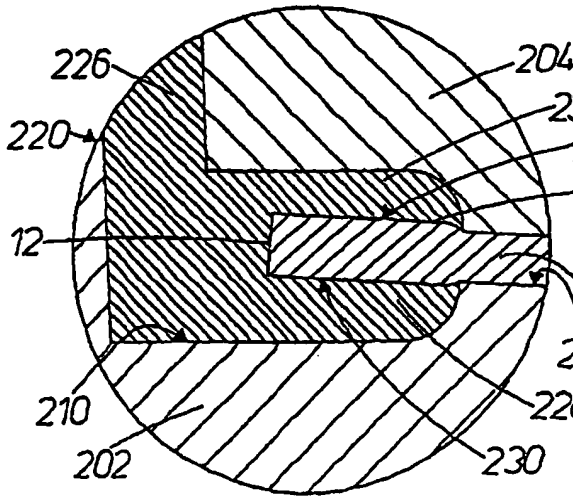

Fig.6